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(54) Title: CLEANING AND MAINTENANCE OF AN INK JET PRINTHEAD		
(57) Abstract		
<p>A method of cleaning an ink jet printhead (1) having a nozzle plate comprises the steps of emitting ink (2) from the nozzles onto the nozzle plate and wiping the ink from the nozzle plate. By emitting ink onto the nozzle plate before wiping the risk of scratching the nozzle plate can be reduced. The emitting of the ink can also effect priming of the nozzles. In preferred embodiments, the nozzle plate is wiped using an absorbent substrate (3) which can help to remove any dirt and residue.</p> <div> </div>		

CLEANING AND MAINTENANCE OF AN INK JET PRINTHEAD

- 5 The present invention relates to the cleaning and maintenance of printheads. Preferred embodiments of the invention relate to an automatic cleaning method for a drop on demand ink jet printhead.

10 A known technique for cleaning drop on demand ink jet printheads is to wipe the face of the nozzle plate with a soft blade to remove debris and excess ink. This can easily scratch the nozzle face as debris is pushed across it. Any damage to the exit area of a nozzle causes errors in the jet angle or may cause build up of a pool of ink preventing droplet ejection. This wiping technique does not re-prime nozzles that have become de-primed.

15 Hewlett-Packard and Epson desktop printers use such soft wiper blades in automatic printhead cleaning systems.

20 Another known technique for cleaning drop on demand ink jet printheads is to wipe and/or blot the nozzle plate manually with an absorbent material. This can scratch the nozzle plate if the nozzle plate is dry, and successful cleaning depends on the skill of the operator. Such absorbent wipes are used manually for cleaning the printheads of Trident printers.

25 An object of the present invention is to provide a method of cleaning an ink jet printhead which does not suffer from one or more of the disadvantages of prior art methods.

30 It is a further object of preferred embodiments the present invention to provide an automatic method of cleaning an ink jet printhead which removes dirt and residue from the printhead upon cleaning.

According to the invention there is provided a method of cleaning an ink jet printhead having a nozzle plate through which the nozzles exit the printhead, the method

comprising the steps of:

- a) emitting ink from the nozzles onto the nozzle plate; and
- b) wiping the ink from the nozzle plate.

5 By emitting ink onto the nozzle plate before the wiping step, the nozzle plate is wetted before cleaning, thus reducing the risk of scratches and damage to the nozzles and/or nozzle plate. Furthermore, the emission of ink from the nozzles acts to re-prime any de-prime nozzles.

10 Preferably the emitting step and the wiping step are carried out in the predetermined timed sequence. Thus the wiping step can be carried out before the emitted ink dries, and preferably the cleaning method is automated.

15 In a preferred embodiment of the invention, the step of emitting ink from the nozzles comprises temporarily increasing the pressure of the ink from its normal operating pressure. Preferably the wiping step is carried out once the pressure of the ink has returned to its normal operating pressure. As the ink returns to its normal pressure, some of the ink emitted onto the nozzle plate will normally be drawn back into the nozzles, thus less ink will be wiped from the nozzle plate, reducing wastage of ink.

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Preferably the wiping step is substantially simultaneous with the returning of the pressure of the ink to its normal operating pressure. This improves the efficiency of the cleaning and reduces the risk that the ink on the nozzle plate starts to dry before the wiping step is carried out.

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Where the printhead includes a row of nozzles, the wiping may be effected in a direction substantially parallel to the row of nozzles, or maybe in another direction, for example substantially perpendicular to the row of nozzles.

30 Preferably an absorbent substrate is used to wipe the ink from the nozzle plate. The use of an absorbent substrate improves the cleaning of the inks from the nozzle plate as well as encouraging drawing debris from the nozzles by capillary action.

Preferably the absorbent substrate comprises a strip of absorbent material, the method

including the step of advancing the strip after the wiping step to provide fresh absorbent substrate for the next wiping step. Thus a clean region of absorbent substrate can be used, either every wiping step or after several wiping steps.

- 5 In a preferred embodiment, the absorbent substrate is stored on a storage reel, and the method includes a step of advancing the reel after the wiping. The advancing of the absorbent substrate may occur after every wiping step, or periodically after several wiping steps.
- 10 After use, the absorbent substrate may be disposed of or, preferably it is cleaned for reuse. Preferably, after the wiping step, a partial vacuum is applied to the absorbent substrate to clean the substrate. Preferably, the method includes a step of reusing the cleaned substrate.
- 15 A further aspect of the invention provides a method of cleaning the nozzles of a printhead, the method comprising the steps of:
 - a) wetting the nozzles of the printhead; and
 - b) wiping the wetted region of the printhead.
- 20 Thus the invention is not restricted for use where the printhead includes a nozzle plate but may be used for cleaning other types of nozzle arrangements. Furthermore, the wetting of the nozzles might be carried out using a material other than the ink in the printhead. For example, a liquid material may be sprayed onto the nozzle before the wiping step.
- 25 In a preferred embodiment, the present invention provides an automatic cleaning and maintenance method for cleaning and maintaining an ink jet printhead comprising the following steps:
 - 30 - an ink pressure application step consisting of applying pressure to the ink to cause ink to flow through a set of printhead nozzles and onto a face of a nozzle plate through which the printhead nozzles exit the printhead;
 - an ink pressure restoration step consisting of restoring the pressure of the ink